



Boeing Plant 2
Seattle/Tukwila, Washington

Phase 1 Transformer PCB Investigation Report

Revised Appendix E Data Validation Reports

April 23, 2004

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Weston Solutions, Inc.
Suite 200
190 Queen Anne Avenue North
Seattle, Washington 98109-4926
206-521-7600 • Fax 206-521-7601
www.westonsolutions.com

MEMORANDUM

DATE: 5 August 2003

TO: Steve Fuller, Project Manager, WESTON, Seattle

FROM: Paul Swift, Senior Chemist, WESTON, Seattle

SUBJECT: Validation of Polychlorinated Biphenyl Compounds as Aroclors Data
Laboratory Batch: FN90
Site: Boeing Plant 2, Tukwila
Project: Transformer Pad Investigation

WORK ORDER NO.: 03709.079.001.0002

cc: Kevin Broom, Geoscientist, WESTON, Seattle
WESTON project file

The quality assurance review of 10 soil samples, laboratory batch **FN90**, collected from/adjacent to the Boeing Plant 2 Facility in Tukwila, Washington on 25 June 2003 has been completed. The water samples were analyzed for polychlorinated biphenyl compounds as Aroclors (PCBs) by Analytical Resources, Inc., of Seattle, Washington following EPA Method 8081A. The samples were numbered:

PL2-SS-SB211-0080	PL2-SS-SB211-0100	PL2-SS-SB211-0120	PL2-SS-SB211-0140
PL2-SS-SB216-0020	PL2-SS-SB216-0040	PL2-SS-SB216-0060	PL2-SS-SB216-0080
PL2-SS-SB216-0100	PL2-SS-SB216-0120		

Data Qualifications

The following comments refer to the laboratory performance in meeting the quality control criteria described in the technical specifications of the laboratory subcontract. The review follows the format described in the *National Functional Guidelines for Organic Data Review* (EPA OSWER Directive 9240.1A-05, October 1999), method quality objectives specified in the *Transformer PCB Investigation Work Plan* (WESTON, February 2003), and specific procedural

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Data validation - Transformer Pad PCB Investigation FN90

5 August 2003



details provided in the individual analytical methods and the analytical laboratory's SOPs (on-file in WESTON's Seattle office).

1. **Timeliness – acceptable**

All samples met holding time criteria of 14 days for sample extraction and 40 additional days for extract analysis for the initial analysis.

2. **GC/MS Instrument Performance Check – not applicable**

The mass spectrometer was not used for this analytical group.

3. **Initial Calibration – acceptable**

All target analytes and system monitoring compounds (surrogates) were within required limits for the initial calibration with average relative response factors greater than 0.05 and \overline{RRF} percent relative standard deviations (percent RSD) less than 30 percent.

4. **Continuing Calibrations – acceptable**

All target analytes were within required limits for the continuing calibration with relative response factors greater than 0.05 and \overline{RRF} percent differences less than 20 percent.

5. **Detection Limits - acceptable**

Laboratory method detection limits and reporting limits met project required quantitation limits unless dilution was required due to background interferences.

6. **Blanks - acceptable**

a) **Laboratory Method Blanks**

Laboratory method blank frequency criteria were met. No target analytes were detected in the method blank.

b) **Field Blanks**

No field blanks were associated with this analytical group.

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7. System Monitoring Compounds (Surrogates) - acceptable

Two surrogate compounds were used to assess accuracy: TCMX (tetrachloro-m-xylene) and DCBP (decachlorobiphenyl). Surrogate compound percent recoveries met quality control criteria for all samples with the exception of TCMX in sample PL2-SS-SB211-0080. Since the surrogate recovery exceeded the upper acceptance criterion and the analyte results were non-detected in the sample, no qualification of the data was required.

8. Laboratory Control Sample (LCS) - acceptable

LCS (blank spike) percent recoveries met quality control criteria for all compounds.

9. Matrix Spike and Matrix Spike Duplicate (MS/MSD) - acceptable

MS/MSD analyses met acceptance criteria for accuracy and precision.

10. Field Duplicate Analysis - not applicable

Field duplicate analysis was not performed for this analytical group.

11. Internal Standards Performance - not applicable

Internal standard analysis is not applicable to this analytical group.

12. Sample Analysis

All laboratory deliverables were present. Several discrepancies were noted and the laboratory contacted. Following is a summary of the discrepancies and their resolution.

- The data report forms (Form 1) indicate that Florisil cleanup was performed on sample extracts for all QC samples. The laboratory indicated that this was an oversight in preparing the data forms and that revised forms would be distributed to all data package recipients.
- Standards preparation logbook photocopies were not included. The laboratory will provide these photocopies to all recipients for inclusion in the data packages.
- When Form 8 (Analytical Sequence) spans multiple pages the sequence number is reset to '01' on each subsequent page. Although the injection date/time

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sequencing is correct, the sample count should continue on each subsequent data form.

No other problems were noted.

13. Laboratory Contact

The laboratory was contacted via phone and email regarding the discrepancies described above. The correspondence is included in the WESTON project file.

Data Assessment

Upon consideration of the data qualifications noted above, the data are **ACCEPTABLE** for use except where flagged with data qualifiers that modify the usefulness of the individual values.

Data Qualifiers

- U - The compound was analyzed for, but was not detected.
- UJ - The compound was analyzed for, but was not detected. The associated quantitation limit is an estimate because quality control criteria were not met.
- J - The analyte was positively identified, but the associated numerical value is an estimated quantity because quality control criteria were not met or because concentrations reported are less than CRDL or lowest calibration standard.
- R - Quality control indicates that data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification.
- N - Presumptive evidence of presence of material (tentative identification).

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Data validation - Transformer Pad PCB Investigation FN90

5 August 2003



Weston Solutions, Inc.
Suite 200
190 Queen Anne Avenue North
Seattle, Washington 98109-4926
206-521-7600 • Fax 206-521-7601
www.westonsolutions.com

MEMORANDUM

DATE: 5 August 2003

TO: Steve Fuller, Project Manager, WESTON, Seattle

FROM: Paul Swift, Senior Chemist, WESTON, Seattle

SUBJECT: Validation of Polychlorinated Biphenyl Compounds as Aroclors Data
Laboratory Batch: FO34
Site: Boeing Plant 2, Tukwila
Project: Transformer Pad Investigation

WORK ORDER NO.: 03709.079.001.0002

cc: Kevin Broom, Geoscientist, WESTON, Seattle
WESTON project file

The quality assurance review of 2 water samples, laboratory batch FO34, collected from/adjacent to the Boeing Plant 2 Facility in Tukwila, Washington on 12 June 2003 has been completed. The water samples were analyzed for polychlorinated biphenyl compounds as Aroclors (PCBs) by Analytical Resources, Inc., of Seattle, Washington following EPA Method 8081A. The samples were numbered:

JFO-SS-SB243-4060 JFO-SS-SB239-4060

Data Qualifications

The following comments refer to the laboratory performance in meeting the quality control criteria described in the technical specifications of the laboratory subcontract. The review follows the format described in the *National Functional Guidelines for Organic Data Review* (EPA OSWER Directive 9240.1A-05, October 1999), method quality objectives specified in the *Transformer PCB Investigation Work Plan* (WESTON, February 2003), and specific procedural details provided in the individual analytical methods and the analytical laboratory's SOPs (on-file in WESTON's Seattle office).

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Data validation - Transformer Pad PCB Investigation FO34

5 August 2003



1. **Timeliness - acceptable**

All samples met holding time criteria of 14 days for sample extraction and 40 additional days for extract analysis for the initial analysis.

2. **GC/MS Instrument Performance Check - not applicable**

The mass spectrometer was not used for this analytical group.

3. **Initial Calibration - acceptable**

All target analytes and system monitoring compounds (surrogates) were within required limits for the initial calibration with average relative response factors greater than 0.05 and \overline{RRF} percent relative standard deviations (percent RSD) less than 30 percent.

4. **Continuing Calibrations - acceptable**

All target analytes were within required limits for the continuing calibration with relative response factors greater than 0.05 and \overline{RRF} percent differences less than 20 percent.

5. **Detection Limits - acceptable**

Laboratory method detection limits and reporting limits met project required quantitation limits unless dilution was required due to background interferences.

6. **Blanks - acceptable**

a) **Laboratory Method Blanks**

Laboratory method blank frequency criteria were met. No target analytes were detected in the method blank.

b) **Field Blanks**

No field blanks were associated with this analytical group.

7. **System Monitoring Compounds (Surrogates) - acceptable**

Two surrogate compounds were used to assess accuracy: TCMX (tetrachloro-m-xylene) and DCBP (decachlorobiphenyl). Surrogate compound percent recoveries met quality control criteria for all samples.

8. **Laboratory Control Sample (LCS) - acceptable**

LCS (blank spike) percent recoveries met quality control criteria for all compounds.

9. **Matrix Spike and Matrix Spike Duplicate (MS/MSD) - not applicable**

MS/MSD analyses were not performed for this analytical group.

10. **Field Duplicate Analysis - not applicable**

Field duplicate analysis was not performed for this analytical group.

11. **Internal Standards Performance - not applicable**

Internal standard analysis is not applicable to this analytical group.

12. **Sample Analysis**

All laboratory deliverables were present. Several discrepancies were noted and the laboratory contacted. Following is a summary of the discrepancies and their resolution.

- The data report forms (Form 1) indicate that Florisil cleanup was performed on sample extracts for all QC samples. The laboratory indicated that this was an oversight in preparing the data forms and that revised forms would be distributed to all data package recipients.
- Standards preparation logbook photocopies were not included. The laboratory will provide these photocopies to all recipients for inclusion in the data packages.
- When Form 8 (Analytical Sequence) spans multiple pages the sequence number is reset to '01' on each subsequent page. Although the injection date/time sequencing is correct, the sample count should continue on each subsequent data form.

No other problems were noted.

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13. Laboratory Contact

The laboratory was contacted via phone and email regarding the discrepancies described above. The correspondence is included in the WESTON project file.

Data Assessment

Upon consideration of the data qualifications noted above, the data are ACCEPTABLE for use except where flagged with data qualifiers that modify the usefulness of the individual values.

Data Qualifiers

- U - The compound was analyzed for, but was not detected.
- UJ - The compound was analyzed for, but was not detected. The associated quantitation limit is an estimate because quality control criteria were not met.
- J - The analyte was positively identified, but the associated numerical value is an estimated quantity because quality control criteria were not met or because concentrations reported are less than CRDL or lowest calibration standard.
- R - Quality control indicates that data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification.
- N - Presumptive evidence of presence of material (tentative identification).

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Weston Solutions, Inc.
Suite 200
190 Queen Anne Avenue North
Seattle, Washington 98109-4926
206-521-7600 • Fax 206-521-7601
www.westonsolutions.com

PLANT 2 TRANSFORMER PCB INVESTIGATION DATA VALIDATION QA/QC REVIEW

1 INTRODUCTION

A total of 220 soil and 20 water samples collected during the Transformer PCB Investigation at the Boeing Plant 2 Facility, Tukwila, Washington, and at an adjacent property were submitted for laboratory analysis. Two laboratory data packages (reporting 10 soil and 2 water sample results) were subjected to full data review and validation and are reported separately.

Of these, 180 soil and 20 water samples were analyzed for polychlorinated biphenyls as Aroclors (PCB) referencing SW846 Method 8082. Eleven soil and 4 water samples were analyzed for total organic carbon (TOC) referencing ARI SOP 602S. Based on physical observation in the field, 29 soil samples were selected for petroleum hydrocarbon screening following WDOE Method NWTPH-HCID.

Samples were analyzed by Analytical Resources Incorporated of Seattle, Washington in accordance with procedures described in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (USEPA SW-846, 3rd edition), *Ecology's Analytical Methods for Petroleum Hydrocarbons* (Ecology 97-602), and ARI Standard Operating Procedure 602S.

Sample results were analyzed and reported by the laboratory as groups FN48, FN60, FN73, FN74, FN82, FN83, FN89, FN99, FO00, FO22, FO57, FO59, FO89, FQ39, and FQ40.

Quality assurance/quality control (QA/QC) reviews of laboratory procedures were performed on an ongoing basis by the laboratory. A data review was performed on laboratory quality control results summary sheets to ensure they met data quality objectives for the project. Data review followed the format outlined in the *National Functional Guidelines for Organic Data Review* (EPA 1999) and *National Functional Guidelines for Evaluating Inorganic Analyses* (EPA 1994) modified to include specific criteria of the individual analytical methods. Raw laboratory data including calibrations, sample login forms, sample preparation logs and bench sheets, quantitation reports, mass spectra, and chromatograms were provided for review and validation.

Results of the data reviews, organized by analysis class, follow.



2 POLYCHLORINATED BIPHENYLS (PCBS)

2.1 Analytical Methods - acceptable

Samples for PCB analysis were prepared using EPA Method 3550B, ultrasonic extraction of soils, and EPA Method 3510C, separatory funnel extraction of waters, and were analyzed by gas chromatography/electron capture detection utilizing EPA Method 8082.

2.2 Sample Holding Times - acceptable

All samples were prepared and analyzed within holding time limits of 14 days for extraction / 40 days for analysis of all samples.

2.3 Laboratory Detection Limits - acceptable

The laboratory achieved specified detection limits.

2.4 Blank Contamination - acceptable

No target analytes were detected in laboratory or field blanks.

2.5 Surrogate Recovery - acceptable

All surrogate compound recoveries were within advisory QC limits.

2.6 Laboratory Control Sample (LCS) Recovery - acceptable

Laboratory control sample (blank spike) recoveries were within QC limits.

2.7 Matrix Spike Analysis - acceptable

All matrix spike/matrix spike duplicate (MS/MSD) analyses met required accuracy and precision criteria.

2.8 Field Duplicate Sample Analysis - not applicable

Field duplicate sample analysis was not performed for this project.

3 INORGANICS

3.1 Analytical Methods - acceptable

Samples were analyzed for total organic carbon following ARI SOP 602S, combustion followed by infrared detection. Quality control criteria met all Work Plan requirements.

3.2 Sample Holding Times - acceptable

All samples were prepared and analyzed within holding time limit 28 days.

3.3 Laboratory Reporting Limits - acceptable

The laboratory achieved specified reporting limits for all analytes.

3.4 Blank Contamination - acceptable

No target analytes were measured in any blank sample.

3.5 Laboratory Control Sample Recovery - acceptable

Laboratory control was evaluated through the analysis of a solid standard reference material (SRM). Recoveries from this material meet specified acceptance levels.

3.6 Matrix Spike Analysis - acceptable

All matrix spike (MS) analyses yielded acceptable recoveries.

3.7 Duplicate Analysis - acceptable

Duplicate sample analysis met acceptance criteria with the exception of analyses associated with laboratory group FN83. The RPD for this data set (27.3%) exceeded the 25% criterion. No data were flagged for this event.

3.8 Field Duplicate Sample Analysis - not applicable

Field duplicate analysis was not performed for this project.

3.9 Interference Check Sample Analysis - not applicable

Interference check sample analysis is not applicable to this analytical method.

3.10 Initial and Continuing Calibration Verification - acceptable

Initial and continuing calibration check sample analysis results met all laboratory acceptance criteria.

3.11 Linear Range Check Standard - not applicable

The linear range check standard analysis is not applicable to this analytical method.

3.12 ICP Serial Dilution Analysis - not applicable

Serial dilution analysis is not applicable to this analytical method.

3.13 Internal Standard Analysis - not applicable

Internal standard analysis is not applicable to the analytical method.

4 PETROLEUM HYDROCARBONS IDENTIFICATION

4.1 Analytical Methods - *acceptable*

Samples for petroleum hydrocarbon identification analysis were prepared and analyzed using Washington State Department of Ecology Method NWTPH-HCID, extraction followed by gas chromatography separation and flame ionization detection.

Tentative identification was estimated for several samples – the associated analytical results have been qualified (M) to indicate that in the opinion of the reviewer, these results may indicate hydrocarbon presence.

4.2 Sample Holding Times - *acceptable*

All soil samples were prepared and analyzed within the holding time recommendation of 14 days.

4.3 Laboratory Detection Limits - *acceptable*

The laboratory achieved specified detection limits.

4.4 Blank Contamination - *acceptable*

No target analytes were detected in any laboratory blanks.

4.5 Surrogate Compound Recovery - *acceptable*

All surrogate compound recoveries were within advisory QC limits.

4.6 Laboratory Blank Spike Analysis - *acceptable*

Laboratory blank spike recoveries were within laboratory QC acceptance limits.

4.7 Matrix Spike Analysis – *acceptable*

All matrix spike/matrix spike duplicate (MS/MSD) analyses met required accuracy and precision criteria.

4.8 Field Duplicate Sample Analysis – *not applicable*

Field duplicate sample analysis was not performed for this project.


The following qualifiers were used to modify the data quality and usefulness of individual analytical results.

- U - The analyte was not detected at the given quantitation limit.
- J - The analyte was positively identified and detected; however, the concentration is an estimated value because the result is less than the quantitation limit or quality control criteria were not met.
- UJ - The analyte was not detected; the associated quantitation limit is an estimated value.
- R - Data are rejected due to significant exceedence of quality control criteria. The analyte may or may not be present. Additional sampling and analysis are required to determine. For statistical reasons, rejected values are not included in the database.
- M - Tentative identification for petroleum products. The analyte exhibits low spectral match, but based on the reviewer's judgment, is present. The chromatogram of the sample did not match that of the requested product.

6 DATA ASSESSMENT

Data review was performed by an experienced quality assurance chemist independent of the analytical laboratory and not directly involved in the project.

This is to certify that I have examined the analytical data and based on the information provided to me by the laboratory, in my professional judgment the data are acceptable for use except where indicated with data qualifiers that may modify the usefulness of those individual values.



R. Paul Swift, Ph.D.
Chief Chemist

August 6, 2003
Date

**Phase 1 Transformer PCB Investigation
Boeing Plant 2
Seattle, Washington**

DATA VALIDATION

Prepared for
The Boeing Company
Seattle, Washington

Prepared by
Sayler Data Solutions, Inc.
14257 – 93rd Court NE
Bothell, WA 98011

April 19, 2004

CONTENTS

1.0 INTRODUCTION	1
2.0 PCB ANALYSES	4
2.1 LABORATORY QUALITY CONTROL ANALYSIS FREQUENCIES - <i>ACCEPTABLE</i>	4
2.2 EXTRACTION AND ANALYSIS HOLDING TIMES - <i>ACCEPTABLE</i>	4
2.3 REPORTING LIMITS - <i>ACCEPTABLE</i>	4
2.4 LABORATORY BLANK RESULTS - <i>ACCEPTABLE</i>	5
2.5 SURROGATE RECOVERIES - <i>ACCEPTABLE</i>	5
2.6 SRM RESULTS - <i>DISCUSSION</i>	5
2.7 LCS RECOVERIES - <i>ACCEPTABLE</i>	5
2.8 MS AND MSD RECOVERIES - <i>ACCEPTABLE</i>	5
2.9 MS/MSD RELATIVE PERCENT DIFFERENCES - <i>ACCEPTABLE</i>	6
2.10 LABORATORY QUALIFIERS AND MULTIPLE REPORTED RESULTS - <i>ACCEPTABLE WITH QUALIFICATION</i>	6
2.11 FIELD DUPLICATE VARIABILITY - <i>ACCEPTABLE WITH QUALIFICATION</i>	6
2.12 ELECTRONIC DATA DELIVERABLE - <i>ACCEPTABLE WITH CORRECTION</i>	7
2.13 OVERALL ASSESSMENT	7
3.0 TOC ANALYSIS	8
3.1 LABORATORY QUALITY CONTROL ANALYSIS FREQUENCIES - <i>ACCEPTABLE</i>	8
3.2 ANALYSIS HOLDING TIMES - <i>ACCEPTABLE</i>	8
3.3 REPORTING LIMITS - <i>NOT APPLICABLE</i>	8
3.4 LABORATORY BLANK RESULTS - <i>ACCEPTABLE</i>	8
3.5 SRM RESULTS - <i>ACCEPTABLE</i>	8
3.6 MS RECOVERIES - <i>ACCEPTABLE</i>	8
3.7 LABORATORY TRIPPLICATE RELATIVE STANDARD DEVIATIONS - <i>ACCEPTABLE</i>	9
3.8 FIELD DUPLICATE VARIABILITY - <i>ACCEPTABLE WITH QUALIFICATION</i>	9
3.9 ELECTRONIC DATA DELIVERABLE - <i>ACCEPTABLE</i>	9
3.10 OVERALL ASSESSMENT	9
4.0 TOTAL SOLIDS ANALYSIS	10
4.1 LABORATORY QUALITY CONTROL ANALYSIS FREQUENCIES - <i>ACCEPTABLE</i>	10
4.2 ANALYSIS HOLDING TIMES - <i>ACCEPTABLE</i>	10
4.3 LABORATORY BLANK RESULTS - <i>ACCEPTABLE</i>	10
4.4 LABORATORY TRIPPLICATE RELATIVE STANDARD DEVIATIONS - <i>ACCEPTABLE</i>	10
4.5 FIELD DUPLICATE VARIABILITY - <i>ACCEPTABLE</i>	10
4.6 ELECTRONIC DATA DELIVERABLE - <i>ACCEPTABLE</i>	10
4.7 OVERALL ASSESSMENT	11
5.0 GRAIN SIZE ANALYSIS	12

5.1	LABORATORY QUALITY CONTROL ANALYSIS FREQUENCIES - <i>ACCEPTABLE</i>	12
5.2	ANALYSIS HOLDING TIMES - <i>ACCEPTABLE</i>	12
5.3	LABORATORY TRIPPLICATE VARIABILITY - <i>ACCEPTABLE WITH QUALIFICATION</i>	12
5.4	FIELD DUPLICATE VARIABILITY - <i>ACCEPTABLE WITH QUALIFICATION</i>	12
5.5	ELECTRONIC DATA DELIVERABLE - <i>ACCEPTABLE WITH CORRECTION</i>	13
5.6	OVERALL ASSESSMENT	13
6.0	QUALIFIER SUMMARY TABLE	14
7.0	ABBREVIATIONS AND DEFINITIONS	16
8.0	REFERENCES	17

1.0 INTRODUCTION

Validation was performed on the following samples and field duplicates:

Sample ID	Lab Sample ID	Matrix	Sample Date	Report Date	Analyses
SD-DUW164-0020	FT81A	Sediment	08/20/03	9/4/03	PCBs, TOC, TS
SD-DUW161-0000	FT81B	Sediment	08/20/03	9/4/03	PCBs, TOC, TS, Grainsize
SD-DUW161-0020	FT81C	Sediment	08/20/03	9/4/03	PCBs, TOC, TS
SD-DUW161-0040	FT81D	Sediment	08/20/03	9/4/03	PCBs, TOC, TS
SD-DUW154-0000	FT81I	Sediment	08/20/03	9/4/03	PCBs, TOC, TS, Grainsize
SD-DUW154-0020	FT81J	Sediment	08/20/03	9/4/03	PCBs, TOC, TS
SD-DUW154-0040	FT81K	Sediment	08/20/03	9/4/03	PCBs, TOC, TS
SD-DUW155-0000	FT81L	Sediment	08/20/03	9/4/03	PCBs, TOC, TS, Grainsize
SD-DUW155-0020	FT81M	Sediment	08/20/03	9/4/03	PCBs, TOC, TS
SD-DUW155-0040	FT81N	Sediment	08/20/03	9/4/03	PCBs, TOC, TS
SD-DUW159-0040	FT81O	Sediment	08/20/03	9/4/03	PCBs, TOC, TS
SD-DUW159-0020	FT81P	Sediment	08/20/03	9/4/03	PCBs, TOC, TS
SD-DUW159-0000	FT81Q	Sediment	08/20/03	9/4/03	PCBs, TOC, TS, Grainsize
SD-DUW156-0000	FT81R	Sediment	08/20/03	9/4/03	PCBs, TOC, TS, Grainsize
SD-DUW156-0020	FT81S	Sediment	08/20/03	9/4/03	PCBs, TOC, TS
SD-DUW156-0040	FT81T	Sediment	08/20/03	9/4/03	PCBs, TOC, TS
SD-DUW164-0000	FT81U	Sediment	08/20/03	9/4/03	PCBs, TOC, TS, Grainsize
SD-DUW158-0000	FU01A	Sediment	08/21/03	9/8/03	PCBs, TOC, TS, Grainsize
SD-DUW158-0020	FU01B	Sediment	08/21/03	9/8/03	PCBs, TOC, TS
SD-DUW158-0040	FU01C	Sediment	08/21/03	9/8/03	PCBs, TOC, TS
SD-DUW157-0000	FU01D	Sediment	08/21/03	9/8/03	PCBs, TOC, TS, Grainsize
SD-DUW157-0020	FU01E	Sediment	08/21/03	9/8/03	PCBs, TOC, TS
SD-DUW157-0040	FU01F	Sediment	08/21/03	9/8/03	PCBs, TOC, TS
SD-DUW153-0000	FU01G	Sediment	08/21/03	9/8/03	PCBs, TOC, TS, Grainsize
SD-DUW153-0020	FU01H	Sediment	08/21/03	9/8/03	PCBs, TOC, TS
SD-DUW153-0040	FU01I	Sediment	08/21/03	9/8/03	PCBs, TOC, TS
SD-DUW162-0000	FU01J	Sediment	08/21/03	9/8/03	PCBs, TOC, TS, Grainsize
SD-DUW162-0020	FU01K	Sediment	08/21/03	9/8/03	PCBs, TOC, TS
SD-DUW162-0040	FU01L	Sediment	08/21/03	9/8/03	PCBs, TOC, TS
SD-DUW160-0000	FU01M	Sediment	08/21/03	9/8/03	PCBs, TOC, TS, Grainsize
SD-DUW160-0020	FU01N	Sediment	08/21/03	9/8/03	PCBs, TOC, TS

Sample ID	Lab Sample ID	Matrix	Sample Date	Report Date	Analyses
SD-DUW160-0040	FU01O	Sediment	08/21/03	9/8/03	PCBs, TOC, TS
SD-DUW165-0000	FU01P	Sediment	08/22/03	9/8/03	PCBs, TOC, TS, Grainsize
SD-DUW165-0020	FU01Q	Sediment	08/22/03	9/8/03	PCBs, TOC, TS
SD-DUW165-0040	FU01R	Sediment	08/22/03	9/8/03	PCBs, TOC, TS
SD-DUW163-0000	FU01S	Sediment	08/22/03	9/8/03	PCBs, TOC, TS, Grainsize
SD-DUW163-0020	FU01T	Sediment	08/22/03	9/8/03	PCBs, TOC, TS
SD-DUW163-0040	FU01U	Sediment	08/22/03	9/8/03	PCBs, TOC, TS
SD-DUW157D-0000	FU01V	Sediment	08/22/03	9/8/03	PCBs, TOC, TS, Grainsize
SD-DUW157D-0020	FU01W	Sediment	08/22/03	9/8/03	PCBs, TOC, TS
SD-SWY14	FU98A	Sediment	09/09/03	9/25/03	PCBs, TOC, TS, Grainsize
SD-SWY15	FU98B	Sediment	09/09/03	9/25/03	PCBs, TOC, TS, Grainsize
SD-SWY16	FU98C	Sediment	09/09/03	9/25/03	PCBs, TOC, TS, Grainsize
SD-SWY17	FU98D	Sediment	09/09/03	9/25/03	PCBs, TOC, TS, Grainsize
SD-SWY19	FV45A	Sediment	09/12/03	9/25/03	PCBs, TOC, TS, Grainsize
SD-DUW154-0060	FV77I	Sediment	08/20/03	10/21/03	PCBs, TOC, TS
SD-DUW155-0060	FV77J	Sediment	08/20/03	10/21/03	PCBs, TOC, TS
SD-DUW156-0050	FV77K	Sediment	08/20/03	10/21/03	PCBs, TOC, TS
SD-DUW164-0030	FV77L	Sediment	08/20/03	10/21/03	PCBs, TOC, TS
SD-DUW157-0030	FV77N	Sediment	08/21/03	10/21/03	PCBs, TOC, TS
SD-DUW157-0030	FV77NDL	Sediment	08/21/03	10/21/03	PCBs
SD-DUW153-0050	FV77O	Sediment	08/21/03	10/21/03	PCBs, TOC, TS
SD-DUW157D-0030	FV77P	Sediment	08/22/03	10/21/03	PCBs, TOC, TS
SD-DUW154-0070	FY52A	Sediment	08/20/03	11/4/03	PCBs, TOC, TS
SD-DUW155-0070	FY52B	Sediment	08/20/03	11/4/03	PCBs, TOC, TS
SD-DUW157D-0040	FY52C	Sediment	08/22/03	11/4/03	PCBs, TOC, TS
SD-DUW153-0000	FZ19A	Sediment	08/21/03	11/4/03	PCBs

Electronic data files were provided for each laboratory batch. These files were dated 11/7/03.

Analyses were performed by Analytical Resources, Inc. (ARI), in Seattle, Washington. Polychlorinated biphenyl (PCB) analysis was performed by EPA SW846 Method 8082 and Puget Sound Dredged Disposal Analysis (PSDDA) guidelines. Extraction method EPA SW846 3550B was used. Total organic carbon (TOC) analysis was performed according to Method Plumb, 1981 and PSDDA guidelines. Total solids analysis was performed according to Method 160.3. Grain size analysis was performed according to the PSEP method.

A summary evaluation was performed on the analytical results. Evaluation was performed by Cari Sayler of Sayler Data Solutions, Inc. Numeric quality control criteria for the requirements listed below are presented in the project sampling and analysis plans, or in the quality control sections of the laboratory reports. Data qualifiers are assigned based only on the criteria reviewed and do not include calibration or instrument performance issues unless noted in the laboratory narrative. Data qualifiers are summarized in Section 6.0 of this appendix, and defined in Section 7.0.

2.0 PCB ANALYSES

2.1 LABORATORY QUALITY CONTROL ANALYSIS FREQUENCIES - ACCEPTABLE

The SAP specified that the following quality control samples be analyzed one per sample batch: method blank, LCS, MS, and either MSD or lab duplicate. The SAP also specified that surrogate compounds must be measured in each field and quality control sample. Additionally, the SAP specified that an SRM must be run in the first batch and in every third batch after that.

Each analytical batch included a method blank, LCS, MS, and MSD, and appropriate surrogates. SRMs were analyzed in batches FT81, FV77, and FY52.

2.2 EXTRACTION AND ANALYSIS HOLDING TIMES - ACCEPTABLE

Refrigerated samples must be extracted within 14 days of collection. Frozen samples must be extracted within 1 year of collection. Extracts must be analyzed within 40 days of extraction. All holding times were met.

2.3 REPORTING LIMITS - ACCEPTABLE

The SAPs specified reporting limit (RL) requirements for low-level PCBs of 40 µg/kg for PCB 1221 and 20 µg/kg for each remaining PCB. The SAPs also specified RLs of 500-µg/kg for medium-level PCBs.

RLs of some aroclors were elevated due to sample dilutions or due to matrix interferences. In most cases, the sample also contained detected aroclors and the total PCB value was unaffected by the elevated RLs.

Seven samples without detected aroclors contained elevated RLs. The elevated RL in sample SD-DUW153-0050 was below the screening level of 130 µg/kg and was considered acceptable. The elevated RLs in SD-DUW154-0060, SD-DUW155-0060, SD-DUW157-0020, SD-DUW157-0030, SD-DUW157-0030, AND SD-DUW157D-0030 were above the screening level and introduced some uncertainty. Additional samples were analyzed at the next deeper interval at each location and reporting limits within the SAP specifications were obtained at those depths.

2.4 LABORATORY BLANK RESULTS - ACCEPTABLE

Criteria for method blanks are that analyte concentrations must be below the reporting limit, or below 10% of the lowest associated sample concentration. No target analytes were detected in the method blanks.

2.5 SURROGATE RECOVERIES - ACCEPTABLE

The SAP specified control limit for surrogate recovery as 40 to 140%. Decachlorobiphenyl (DCBP) recoveries were not reported in the following samples: SD-DUW153-0000 (FU01), SD-DUW153-0020, SD-DUW153-0040, SD-DUW155-0000, SD-DUW155-0020, SD-DUW155-0040, SD-DUW159-0000, SD-DUW164-0000, SD-DUW165-0000, SD-SWY14, SD-SWY16, and SD-SWY17. The dilution factors in these samples ranged from 2 to 20. Tetrachlorometaxylene (TCMX) recoveries in these samples were acceptable and no qualifiers are assigned.

SD-DUW157-0030 was reanalyzed at a dilution due to interferences and poor DCBP recovery. Surrogate recovery was not improved and the reanalysis is qualified R1, rejected in favor of the original analysis. The original TCMX recovery (112%) was within limits and no qualifiers are assigned in the original analysis.

2.6 SRM RESULTS – DISCUSSION

SRM SQ-1 (Sequim Bay Sediment) was analyzed with PCB 1254 results of 46, 97, and 150 µg/kg. Published PCB 1254 concentrations for this SRM are: expected - 170 µg/kg, average - 112 µg/kg, and standard deviation -39.47. The 46 µg/kg result was below the average by more than 1 standard deviation. However, qualifiers are not assigned based on SRM results alone. Evaluation of surrogate, LCS, MS, MSD and SRM results do not indicate systematic biases, and no qualifiers are assigned.

2.7 LCS RECOVERIES - ACCEPTABLE

SAP-specified control limits for LCS recoveries are 50 to 130%. The recovery for the LCS analyzed with batch FZ19 (45.6%) was below the SAP control limits. The recovery was only slightly out, and no qualifiers are assigned. All other LCS recoveries were within limits.

2.8 MS AND MSD RECOVERIES - ACCEPTABLE

SAP-specified control limits for MS and MSD recoveries are 40 to 140%. Recoveries were not reported for the MS and MSD analyzed with batch FZ19 due to concentrations below the reporting

limit of the diluted analysis. Recoveries were calculated from the raw data and were within the control limit. All other MS and MSD recoveries were within limits.

2.9 MS/MSD RELATIVE PERCENT DIFFERENCES - ACCEPTABLE

SAP-specified control limits for MS/MSD relative percent differences (RPDs) were less than 50%. Reported RPDs were all within limits. RPDs were not reported for the MS and MSD analyzed with batch FZ19 due to concentrations below the reporting limit of the diluted analysis. RPDs were calculated from the raw data and were within the control limit.

2.10 LABORATORY QUALIFIERS AND MULTIPLE REPORTED RESULTS – ACCEPTABLE WITH QUALIFICATION

The dual column concentrations of aroclor 1260 in four samples, SD-DUW 154-0000, SD-DUW 155-0000, SD-DUW 156-0020 and SD-DUW 164-0030, (flagged P in the lab report) had an RPD exceeding 40%, indicating variability. The P-flagged data are qualified as estimated.

The two analyses of sample SD-DUW 157-0030 are discussed in section 2.5 Surrogate recoveries. Sample SD-DUW 153-0000, analyzed in batch FU01, was re-extracted and reanalyzed in batch FZ19 with the addition of a silica gel cleanup. Interferences present in the original analysis were removed and the second analysis is considered more representative of actual aroclor concentrations. The original analysis is qualified R1, rejected in favor of another analysis.

2.11 FIELD DUPLICATE VARIABILITY - ACCEPTABLE WITH QUALIFICATION

Field duplicates were analyzed at the appropriate frequency. The majority of the results (30/35) were not detected in the sample and field duplicate and no RPD was calculated. The remaining results are as follows:

Sample ID	Analyte	Sample Result	Field Dup Result	RPD
SD-DUW157-0000	Aroclor 1248	13,000	20,000	42.4
SD-DUW157-0000	Aroclor 1254	17,000	17,000	0
SD-DUW157-0020	Aroclor 1248	67 Y	59	12.7
SD-DUW157-0020	Aroclor 1254	68 Y	110	47.2
SD-DUW157-0020	Aroclor 1260	130 Y	320	84.4

The RPD for Aroclor 1260 in field duplicate SD-157-0020 exceeds 50 percent and the sample result is qualified as estimated.

2.12 ELECTRONIC DATA DELIVERABLE - ACCEPTABLE WITH CORRECTION

Sample Number Transcription: Sample IDs in the electronic data deliverable (EDD) were compared to the chain of custody for each sample and field duplicate. All sample IDs matched the chain of custody.

10% Transcription Check: One batch (FV77) comprising approximately 10% of the sample results was compared to the laboratory report. The TCMX surrogate recovery for sample SD-DUW157-0030 (112%) was listed as NR in the EDD. Data were validated based on the recoveries reported in the hard copy, and impact is considered minimal. However, correction of this number should be made prior to any use of the EDD. No other discrepancies were noted.

2.13 OVERALL ASSESSMENT

The majority of LCS, MS, MSD, and tetrachlorometaxylene surrogate recoveries were within control limits, demonstrating in-control method accuracy. Dual column and field duplicate variability resulted in the qualification of some results.

Multiple analysis results have been evaluated, and reduced to the most appropriate result. All other PCB data, as qualified, are acceptable for use. PCB data qualifiers are summarized in Section 6.0 of this appendix.

3.0 TOC ANALYSIS

3.1 LABORATORY QUALITY CONTROL ANALYSIS FREQUENCIES - *ACCEPTABLE*

Each analytical batch included a method blank, an MS, triplicates and an SRM, meeting frequency requirements.

3.2 ANALYSIS HOLDING TIMES - *ACCEPTABLE*

Refrigerated samples must be analyzed within 14 days of collection. Frozen samples must be analyzed within 6 months of collection. All holding times were met.

3.3 REPORTING LIMITS - *NOT APPLICABLE*

The SAP specified a reporting limit of 200 mg/kg for TOC. TOC was detected in all samples and reporting limits were not evaluated.

3.4 LABORATORY BLANK RESULTS - *ACCEPTABLE*

Criteria for method blanks are that analyte concentrations must be below the RL, or below 10% of the lowest associated sample concentration. No target analytes were detected in the method blanks.

3.5 SRM RESULTS - *ACCEPTABLE*

SRM NIST # 8704 (Buffalo River Sediment) was analyzed with total carbon results ranging from 3.12 to 3.58%. Published carbon concentrations for this SRM are $3.351 \pm 0.017\%$. The published uncertainty for carbon is extremely low and does not adequately allow for method variability. Control limits based on this value are unrealistic. Laboratory utilizes control limits of 80 – 120 for this SRM and these limits were met.

3.6 MS RECOVERIES - *ACCEPTABLE*

Laboratory-reported control limits for MS recoveries are 75 to 125%. All MS recoveries were within limits.

3.7 LABORATORY TRIPLICATE RELATIVE STANDARD DEVIATIONS - ACCEPTABLE

Method-specified control limits for triplicate RSDs are less than 20%. All triplicate RSDs were within limits.

3.8 FIELD DUPLICATE VARIABILITY - ACCEPTABLE WITH QUALIFICATION

Field duplicates were analyzed at the appropriate frequency. The results are as follows:

Sample ID	Analyte	Sample Result	Field Dup Result	RPD
SD-DUW157-0000	TOC	2.1	3.1	38.5
SD-DUW157-0020	TOC	1.3	1.3	0
SD-DUW157-0030	TOC	3.3	0.5	147.4
SD-DUW157-0040	TOC	0.19	0.44	79.4

Sample results are qualified as estimated where the associated RPD exceeds 20 percent.

3.9 ELECTRONIC DATA DELIVERABLE - ACCEPTABLE

Sample Number Transcription: Sample IDs in the EDD were compared to the chain of custody for each sample and field duplicate. All sample IDs matched the chain of custody.

10% Transcription Check: One batch (FV77) comprising approximately 10% of the sample results was compared to the laboratory report. No discrepancies were noted.

3.10 OVERALL ASSESSMENT

All MSs and SRMs were within control limits, demonstrating in-control method accuracy. Laboratory replicates were within control limits. However, field duplicate variability resulted in the qualification of some results.

All TOC data, as qualified, are acceptable for use. TOC data qualifiers are summarized in Section 6.0 of this appendix.

4.0 TOTAL SOLIDS ANALYSIS

4.1 LABORATORY QUALITY CONTROL ANALYSIS FREQUENCIES - ACCEPTABLE

Each batch included a method blank and a laboratory triplicate, meeting frequency requirements.

4.2 ANALYSIS HOLDING TIMES - ACCEPTABLE

Refrigerated samples must be analyzed within 14 days of collection. Frozen samples must be analyzed within 6 months of collection. All holding times were met.

4.3 LABORATORY BLANK RESULTS - ACCEPTABLE

Criteria for method blanks are that concentrations must be below the RL. This criterion was met.

4.4 LABORATORY TRIPLICATE RELATIVE STANDARD DEVIATIONS - ACCEPTABLE

All triplicate RSDs were below 20%.

4.5 FIELD DUPLICATE VARIABILITY - ACCEPTABLE

Field duplicates were analyzed at the appropriate frequency. All field duplicate RPDs were below 20%. The results are as follows:

Sample ID	Analyte	Sample Result	Field Dup Result	RPD
SD-DUW157-0000	Total Solids	69	71.8	4
SD-DUW157-0020	Total Solids	80.1	80.5	0.5
SD-DUW157-0030	Total Solids	73.4	83.8	13.2
SD-DUW157-0040	Total Solids	82	79.9	2.6

4.6 ELECTRONIC DATA DELIVERABLE - ACCEPTABLE

Sample Number Transcription: Sample IDs in the EDD were compared to the chain of custody for each sample and field duplicate. All sample IDs matched the chain of custody.

10% Transcription Check: One batch (FV77) comprising approximately 10% of the sample results was compared to the laboratory report. No discrepancies were noted.

4.7 OVERALL ASSESSMENT

Laboratory replicates and field duplicates were within control limits, demonstrating in-control precision. No qualifiers were assigned and total solids data are acceptable as reported.

5.0 GRAIN SIZE ANALYSIS**5.1 LABORATORY QUALITY CONTROL ANALYSIS FREQUENCIES - ACCEPTABLE**

Each batch included a laboratory triplicate, meeting frequency requirements.

5.2 ANALYSIS HOLDING TIMES - ACCEPTABLE

Samples must be analyzed within 6 months of collection. Holding times were met.

5.3 LABORATORY TRIPLICATE VARIABILITY - ACCEPTABLE WITH QUALIFICATION

The relative standard deviation (RSD) for the gravel results in SD-DUW164-0000 triplicate (84.6%) exceeded 20%. All gravel results are qualified as estimated. All other triplicate RSDs were below 20%.

5.4 FIELD DUPLICATE VARIABILITY - ACCEPTABLE WITH QUALIFICATION

Field duplicates were analyzed at the appropriate frequency. The results are as follows:

Sample ID	Analyte	Sample Result	Field Dup Result	RPD
SD-DUW157D-0000	Gravel	43.5	43.8	0.7
SD-DUW157D-0000	Very Coarse Sand	8.6	8.6	0
SD-DUW157D-0000	Coarse Sand	10.5	11.9	12.5
SD-DUW157D-0000	Medium Sand	13.4	14.3	6.5
SD-DUW157D-0000	Fine Sand	7.9	7.6	3.9
SD-DUW157D-0000	Very Fine Sand	3.8	3.4	11.1
SD-DUW157D-0000	Coarse Silt	3	1.8	50
SD-DUW157D-0000	Medium Silt	2.4	2.1	13.3
SD-DUW157D-0000	Fine Silt	2.4	2.2	8.7
SD-DUW157D-0000	Very Fine Silt	1.8	1.5	18.2
SD-DUW157D-0000	8-9 Phi Clay	1.1	0.9	20
SD-DUW157D-0000	9-10 Phi Clay	0.8	0.7	13.3
SD-DUW157D-0000	<10 Phi Clay	0.9	1.1	20

The coarse silt RPD exceeded 20%. All coarse silt results are qualified as estimated.

5.5 ELECTRONIC DATA DELIVERABLE - ACCEPTABLE WITH CORRECTION

Sample Number Transcription: Sample IDs in the electronic data deliverable (EDD) were compared to the chain of custody for each sample and field duplicate. All sample IDs matched the chain of custody.

10% Transcription Check: One batch (FU98) comprising more than 10% of the sample results was compared to the laboratory report. The description for very fine silt was misspelled as very file silt each time it appeared in the EDD. No other discrepancies were noted.

5.6 OVERALL ASSESSMENT

Most laboratory replicate and most field duplicate fractions were within control limits, demonstrating in-control precision.

Grain size data, as qualified, are acceptable for use. Grain size data qualifiers are summarized in Section 6.0 of this appendix.

6.0 QUALIFIER SUMMARY TABLE

The following table presents data qualifiers assigned during the data validation process. Final interpretive data qualifiers shown in Tables 3.1 to 3.3 of the report are not shown on the following table.

Sample ID	Analyte	DV Qualifier	Qualifier Reason
PCBs			
SD-DUW 157-0030DL	Aroclor 1016	R1	Mult. Result
SD-DUW 157-0030DL	Aroclor 1221	R1	Mult. Result
SD-DUW 157-0030DL	Aroclor 1232	R1	Mult. Result
SD-DUW 157-0030DL	Aroclor 1242	R1	Mult. Result
SD-DUW 157-0030DL	Aroclor 1248	R1	Mult. Result
SD-DUW 157-0030DL	Aroclor 1254	R1	Mult. Result
SD-DUW 157-0030DL	Aroclor 1260	R1	Mult. Result
SD-DUW 153-0000 (FU01)	Aroclor 1016	R1	Mult. Result
SD-DUW 153-0000 (FU01)	Aroclor 1221	R1	Mult. Result
SD-DUW 153-0000 (FU01)	Aroclor 1232	R1	Mult. Result
SD-DUW 153-0000 (FU01)	Aroclor 1242	R1	Mult. Result
SD-DUW 153-0000 (FU01)	Aroclor 1248	R1	Mult. Result
SD-DUW 153-0000 (FU01)	Aroclor 1254	R1	Mult. Result
SD-DUW 153-0000 (FU01)	Aroclor 1260	R1	Mult. Result
SD-DUW 154-0000	Aroclor 1260	J	Dual column variability
SD-DUW 155-0000	Aroclor 1260	J	Dual column variability
SD-DUW 156-0020	Aroclor 1260	J	Dual column variability
SD-DUW 164-0030	Aroclor 1260	J	Dual column variability
SD-DUW157-0020	Aroclor 1260	UJ	Field duplicate variability
TOC			
SD-DUW157-0000	TOC	J	Field duplicate variability
SD-DUW157-0030	TOC	J	Field duplicate variability
SD-DUW157-0040	TOC	J	Field duplicate variability
Grain Size			
SD-DUW153-0000	Gravel	J	High triplicate RSD
SD-DUW154-0000	Gravel	J	High triplicate RSD
SD-DUW155-0000	Gravel	J	High triplicate RSD
SD-DUW156-0000	Gravel	J	High triplicate RSD

Sample ID	Analyte	DV Qualifier	Qualifier Reason
SD-DUW157-0000	Gravel	J	High triplicate RSD
SD-DUW158-0000	Gravel	J	High triplicate RSD
SD-DUW159-0000	Gravel	J	High triplicate RSD
SD-DUW160-0000	Gravel	J	High triplicate RSD
SD-DUW161-0000	Gravel	J	High triplicate RSD
SD-DUW162-0000	Gravel	J	High triplicate RSD
SD-DUW163-0000	Gravel	J	High triplicate RSD
SD-DUW164-0000	Gravel	J	High triplicate RSD
SD-DUW165-0000	Gravel	J	High triplicate RSD
SD-SWY14	Gravel	J	High triplicate RSD
SD-SWY15	Gravel	J	High triplicate RSD
SD-SWY16	Gravel	J	High triplicate RSD
SD-SWY17	Gravel	J	High triplicate RSD
SD-SWY19	Gravel	J	High triplicate RSD
SD-DUW153-0000	Coarse silt	J	High field duplicate RPD
SD-DUW154-0000	Coarse silt	J	High field duplicate RPD
SD-DUW155-0000	Coarse silt	J	High field duplicate RPD
SD-DUW156-0000	Coarse silt	J	High field duplicate RPD
SD-DUW157-0000	Coarse silt	J	High field duplicate RPD
SD-DUW158-0000	Coarse silt	J	High field duplicate RPD
SD-DUW159-0000	Coarse silt	J	High field duplicate RPD
SD-DUW160-0000	Coarse silt	J	High field duplicate RPD
SD-DUW161-0000	Coarse silt	J	High field duplicate RPD
SD-DUW162-0000	Coarse silt	J	High field duplicate RPD
SD-DUW163-0000	Coarse silt	J	High field duplicate RPD
SD-DUW164-0000	Coarse silt	J	High field duplicate RPD
SD-DUW165-0000	Coarse silt	J	High field duplicate RPD
SD-SWY14	Coarse silt	J	High field duplicate RPD
SD-SWY15	Coarse silt	J	High field duplicate RPD
SD-SWY16	Coarse silt	J	High field duplicate RPD
SD-SWY17	Coarse silt	J	High field duplicate RPD
SD-SWY19	Coarse silt	J	High field duplicate RPD

7.0 ABBREVIATIONS AND DEFINITIONS

DV Qualifier	Definition
J	The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.
JM	A matrix effect was present and the result is an estimate.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.
R	The sample result is rejected. The presence or absence of the analyte cannot be verified and data are not usable.
R1	This sample result has been rejected in favor of a more accurate and/or precise result. The other result should be used.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample reporting limit or the amount of contaminant detected in the sample.
UJ	The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
UM	The analyte was undetected but the reporting limit was elevated due to matrix effects.
Y	Indicates raised detection limit due to background interference or activity on the instrument.

Abbreviation	Definition
DV	Data validation
LCS	Laboratory control sample
LCSD	Laboratory control sample duplicate
MS	Matrix spike
MSD	Matrix spike duplicate
RPD	Relative percent difference
SRM	Standard Reference Material
Surr	Surrogate

8.0 REFERENCES

- Pentec (Pentec Environmental) and FSI (Floyd & Snider Inc.). 2001. *Sampling and Analysis Plan, Design Data Collection: Southwest Bank Interim Measure. Boeing Plant 2*. Prepared for The Boeing Company, Seattle, WA, by Pentec, Edmonds, WA. August 6, 2001.
- EPA (US Environmental Protection Agency). 1999. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*. EPA, Office of Emergency and Remedial Response, EPA540/R 99/008.
- EPA (US Environmental Protection Agency). 1994. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. EPA, Office of Emergency and Remedial Response, EPA540/R 94/013.

Table E-1
Laboratory Batch IDs and Sample Numbers

Laboratory Batch ID	Sample Number	Laboratory Batch ID	Sample Number
FN48	PL2-SS-SB217-0000	FN82 (cont'd)	PL2-SS-SB225-0100
	PL2-SS-SB217-0020		PL2-SS-SB225-0120
	PL2-SS-SB217-0030		PL2-SS-SB225-0140
	PL2-SS-SB217-0040	FN83	PL2-SS-SB211-0060
	PL2-SS-SB217-0050		PL2-SS-SB215-0000
	PL2-SS-SB217-0060		PL2-SS-SB215-0020
	PL2-SS-SB217-0080		PL2-SS-SB215-0040
	PL2-SS-SB217-0100		PL2-SS-SB215-0060
	PL2-SS-SB217-4000		PL2-SS-SB215-0080
FN60	PL2-SS-SB217-0120		PL2-SS-SB215-0100
	PL2-SS-SB217-0140		PL2-SS-SB215-0120
FN73	PL2-SS-SB214-0000		PL2-SS-SB215-0140
	PL2-SS-SB214-0020		PL2-SS-SB218-0000
	PL2-SS-SB214-0040		PL2-SS-SB218-0020
	PL2-SS-SB214-0060		PL2-SS-SB218-0040
	PL2-SS-SB214-0080		PL2-SS-SB218-0060
	PL2-SS-SB214-0100		PL2-SS-SB218-0080
	PL2-SS-SB214-0120		PL2-SS-SB218-0100
	PL2-SS-SB214-0140		PL2-SS-SB218-0120
	PL2-SS-SB224-0000		PL2-SS-SB218-0140
	PL2-SS-SB224-0020		PL2-SS-SB218-4000
	PL2-SS-SB224-0040	FN89	PL2-SS-SB212-0000
	PL2-SS-SB224-4020		PL2-SS-SB212-0020
	PL2-SS-SB226-0000		PL2-SS-SB212-0040
	PL2-SS-SB226-0020		PL2-SS-SB212-0060
	PL2-SS-SB226-0040		PL2-SS-SB212-0080
	PL2-SS-SB226-0060		PL2-SS-SB212-0100
	PL2-SS-SB226-0080		PL2-SS-SB212-0120
	PL2-SS-SB226-0100		PL2-SS-SB212-0140
	PL2-SS-SB226-0120		PL2-SS-SB212-4140
	PL2-SS-SB226-0140		PL2-SS-SB216-0000
FN74	PL2-SS-SB213-0000		PL2-SS-SB219-0000
	PL2-SS-SB213-0020		PL2-SS-SB219-0020
	PL2-SS-SB213-0040		PL2-SS-SB219-0040
	PL2-SS-SB213-0060		PL2-SS-SB219-0060
	PL2-SS-SB213-0080		PL2-SS-SB219-0080
	PL2-SS-SB213-0100		PL2-SS-SB219-0100
	PL2-SS-SB213-0120		PL2-SS-SB219-0120
	PL2-SS-SB213-0140		PL2-SS-SB219-0140
	PL2-SS-SB224-0060		PL2-SS-SB222-0000
	PL2-SS-SB224-0080		PL2-SS-SB222-4000
	PL2-SS-SB224-0100	FN90	PL2-SS-SB211-0080
	PL2-SS-SB224-0120		PL2-SS-SB211-0100
	PL2-SS-SB224-0140		PL2-SS-SB211-0120
FN82	PL2-SS-SB211-0000		PL2-SS-SB211-0140
	PL2-SS-SB211-0020		PL2-SS-SB216-0020
	PL2-SS-SB211-0040		PL2-SS-SB216-0040
	PL2-SS-SB223-0000		PL2-SS-SB216-0060
	PL2-SS-SB223-0020		PL2-SS-SB216-0080
	PL2-SS-SB223-0040		PL2-SS-SB216-0100
	PL2-SS-SB223-0060		PL2-SS-SB216-0120
	PL2-SS-SB223-0080		PL2-SS-SB216-0140
	PL2-SS-SB223-0100		PL2-SS-SB222-0020
	PL2-SS-SB223-0120		PL2-SS-SB222-0040
	PL2-SS-SB223-0140		PL2-SS-SB222-0060
	PL2-SS-SB223-4000		PL2-SS-SB222-0080
	PL2-SS-SB225-0000		PL2-SS-SB222-0100
	PL2-SS-SB225-0020		PL2-SS-SB222-0120
	PL2-SS-SB225-0040		PL2-SS-SB222-0140
	PL2-SS-SB225-0060	FN99	JFO-SS-SB220-0000
	PL2-SS-SB225-0080		JFO-SS-SB220-0020

Table E-1
Laboratory Batch IDs and Sample Numbers

Laboratory Batch ID	Sample Number	Laboratory Batch ID	Sample Number
FN99 (cont'd)	JFO-SS-SB220-0040	FO89 (cont'd)	JFO-SS-SB235-0120
	JFO-SS-SB220-0060		JFO-SS-SB235-0140
	JFO-SS-SB220-0080		JFO-SS-SB236-0120
	JFO-SS-SB220-0100		JFO-SS-SB237-0120
	JFO-SS-SB220-0120		JFO-SS-SB244-0100
	JFO-SS-SB220-0140		JFO-SS-SB244-0140
	JFO-SS-SB220-4040		JFO-SS-SB245-0120
	JFO-SS-SB234-0000		JFO-SS-SB245-0140
	JFO-SS-SB234-0020		JFO-SS-SB247-0120
	JFO-SS-SB234-0040		PL2-SS-SB211-0120
	JFO-SS-SB234-0060		PL2-SS-SB213-0100
	JFO-SS-SB234-0080		PL2-SS-SB213-0120
	JFO-SS-SB234-0100		PL2-SS-SB214-0140
	JFO-SS-SB234-0120		PL2-SS-SB217-0100
	JFO-SS-SB234-0140		PL2-SS-SB221-0080
	JFO-SS-SB234-4020		PL2-SS-SB225-0100
FO00	JFO-SS-SB228-0000	FQ39	PL2-SS-SB227-0100
	JFO-SS-SB228-0020		PL2-SS-SB227-0120
	JFO-SS-SB228-0060		PL2-SS-SB221-0000
	JFO-SS-SB228-0080		PL2-SS-SB221-0015
	JFO-SS-SB228-0100		PL2-SS-SB221-0025
	JFO-SS-SB228-0120		PL2-SS-SB221-0040
	JFO-SS-SB228-0140		PL2-SS-SB221-0060
	JFO-SS-SB228-4060		PL2-SS-SB221-0065
	JFO-SS-SB245-0000		PL2-SS-SB221-0080
	JFO-SS-SB245-0040		PL2-SS-SB221-0100
	JFO-SS-SB245-0060		PL2-SS-SB221-0120
	JFO-SS-SB245-0080		PL2-SS-SB221-0140
	JFO-SS-SB245-0100		PL2-SS-SB227-0000
	JFO-SS-SB245-0120		PL2-SS-SB227-0020
	JFO-SS-SB245-0140		PL2-SS-SB227-0040
	JFO-SS-SB247-0000		PL2-SS-SB227-0060
	JFO-SS-SB247-0020		PL2-SS-SB227-0080
	JFO-SS-SB247-0040		PL2-SS-SB227-0100
	JFO-SS-SB247-0060		PL2-SS-SB227-0115
	JFO-SS-SB247-0080		PL2-SS-SB227-0120
	JFO-SS-SB247-0100		PL2-SS-SB227-0140
	JFO-SS-SB247-0120	FQ40	JFO-SS-SB246-0000
	JFO-SS-SB247-0140		JFO-SS-SB246-0020
FO00K	JFO-SS-SB228-0040		JFO-SS-SB246-0040
FO00S	JFO-SS-SB245-0020		JFO-SS-SB246-0060
FO22	JFO-SS-SB230-4060		JFO-SS-SB246-0100
	JFO-SS-SB233-4060		JFO-SS-SB246-0120
	JFO-SS-SB244-4060		JFO-SS-SB246-0140
FO57	JFO-SS-SB238-4060		
	JFO-SS-SB242-4060		
FO59	JFO-GW-MWJF01AR-0000		
	JFO-GW-MWJF02A-0000		
	PL2-GW-MW006A-0000		
	PL2-GW-MW007A-0000		
FO89	JFO-SS-SB220-0120		
	JFO-SS-SB228-0120		
	JFO-SS-SB229-0100		
	JFO-SS-SB229-0120		
	JFO-SS-SB232-0100		
	JFO-SS-SB232-0120		
	JFO-SS-SB232-0140		
	JFO-SS-SB233-0100		
	JFO-SS-SB233-0120		
	JFO-SS-SB233-0140		
	JFO-SS-SB234-0120		